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Economic and Social Systems: Implications for Long-Term Planning on The Gulf Coast

Presented to:

Coastal Engineering Research Board
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Importance of Relationships Between Systems

- Successful flood risk management depends on the integration of engineering, environmental, economic, social, legal, and political subsystems.
- Outcomes of risk management are measured in economic and social outputs
  - **Increased Public Health and Safety**
  - **Reduced Damages**

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Systems Thinking

Incentives and disincentives must be built into the system in the form of feedback loops.

Feedback would reflect “costs” associated with increasing or reducing risks.

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1% Hazard Zone is Poor Feedback Loop

- Must get away from binary risk indicators – “You’re in” or “you’re out” of the base-flood (1%) hazard area
- Risk is graduated, but never Zero as implied by “you’re out”
- “You’re out” becomes goal of many, and leaves unmitigated residual risk

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Paradox of Increasing Flood Damages over Time

- Safe Development Paradox
  - Protection projects make areas “safe” for development, yet these areas become increasingly vulnerable to catastrophe
- Local Government Paradox
  - Local citizens bear brunt of disaster consequences
  - However, local actions lead to unintentional increase in risks over time

(Burby, 2006)

Future Hurricane Events

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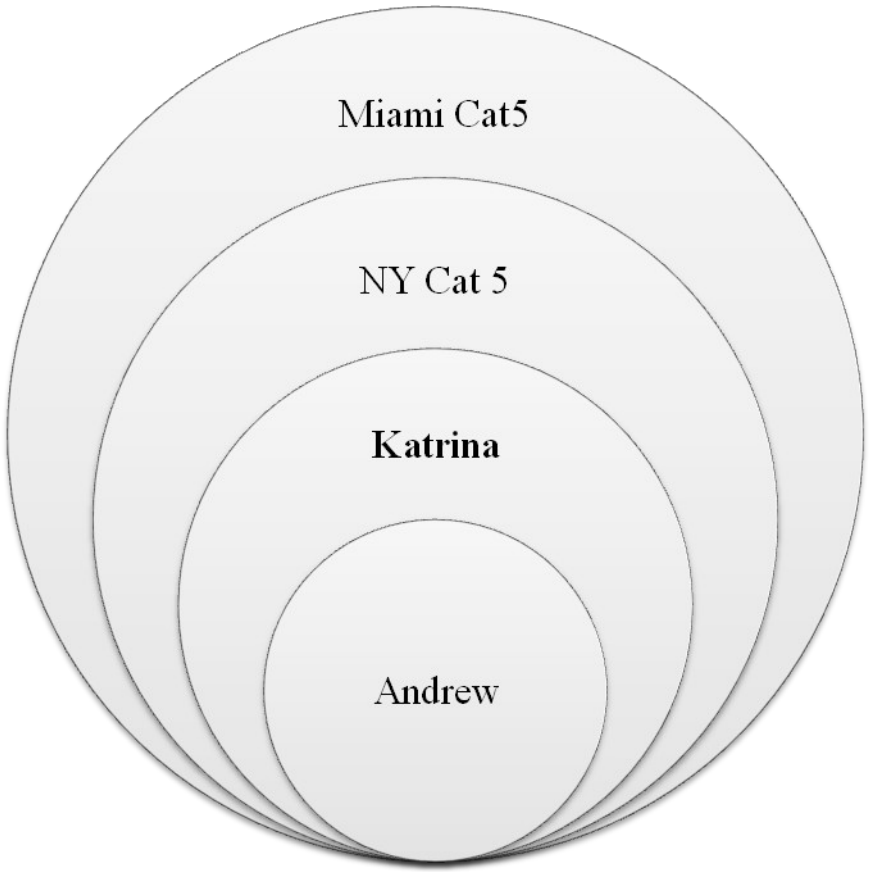

Miami 3x Katrina
NYC 2x Katrina

In 2005 dollars

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Solving the Right Problem

The Problem is not “How high should we construct this levee?” or “How many acres of wetlands do we need to restore?” or even “How quickly can we rebuild how many houses?”

The problem is how do we reduce flood risk to support sustainable, resilient communities?

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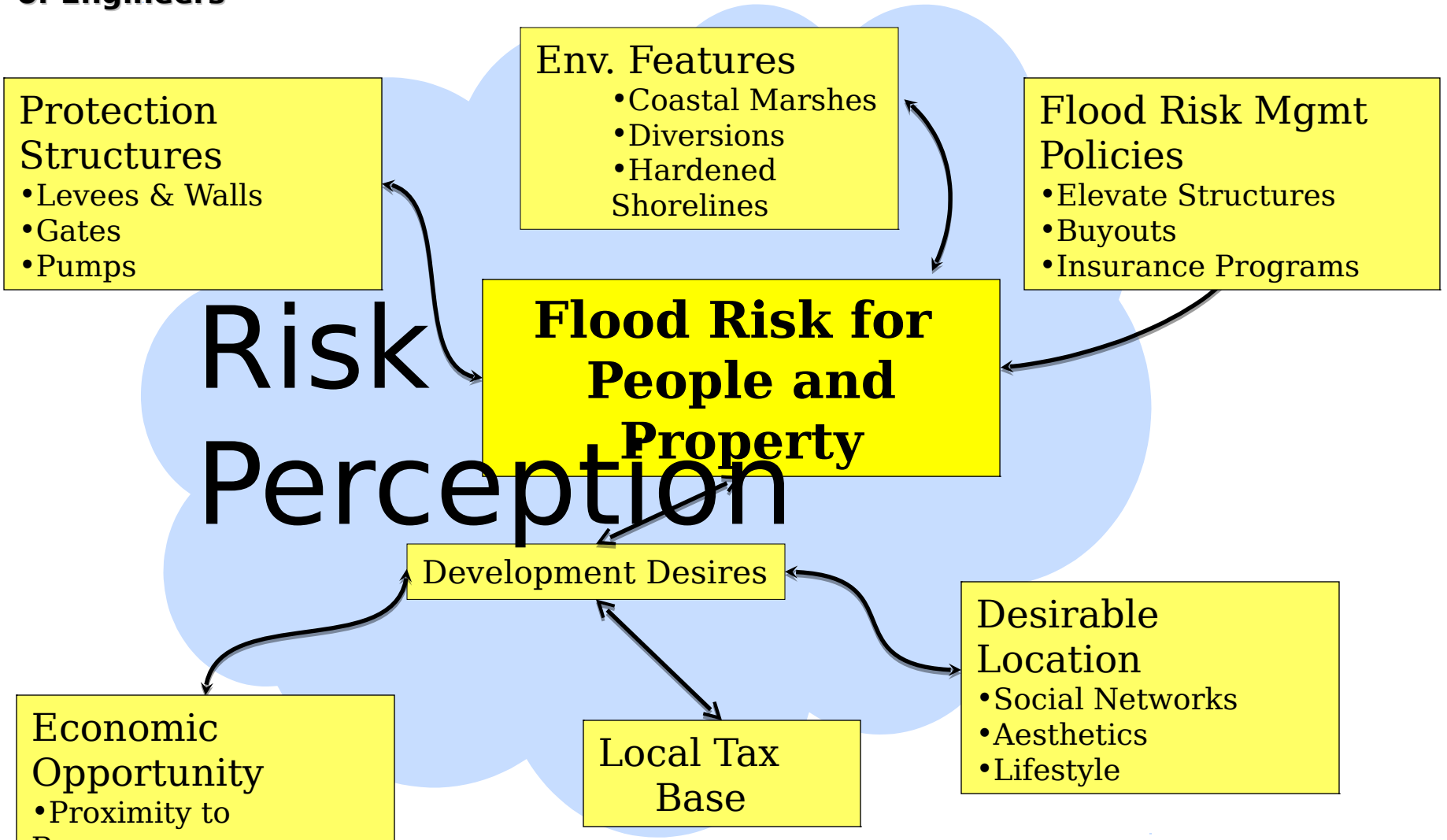
Flood Risk "Relationships"



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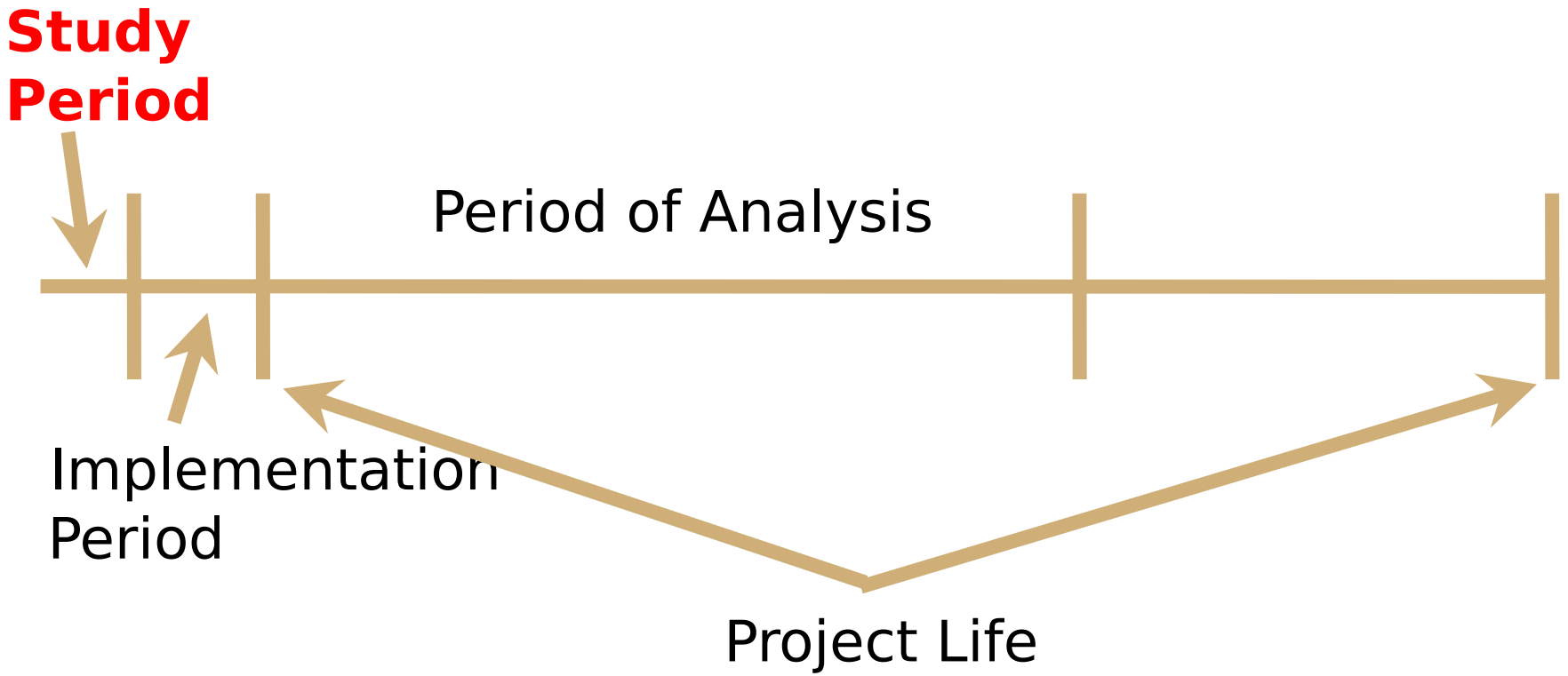
Planning Horizon



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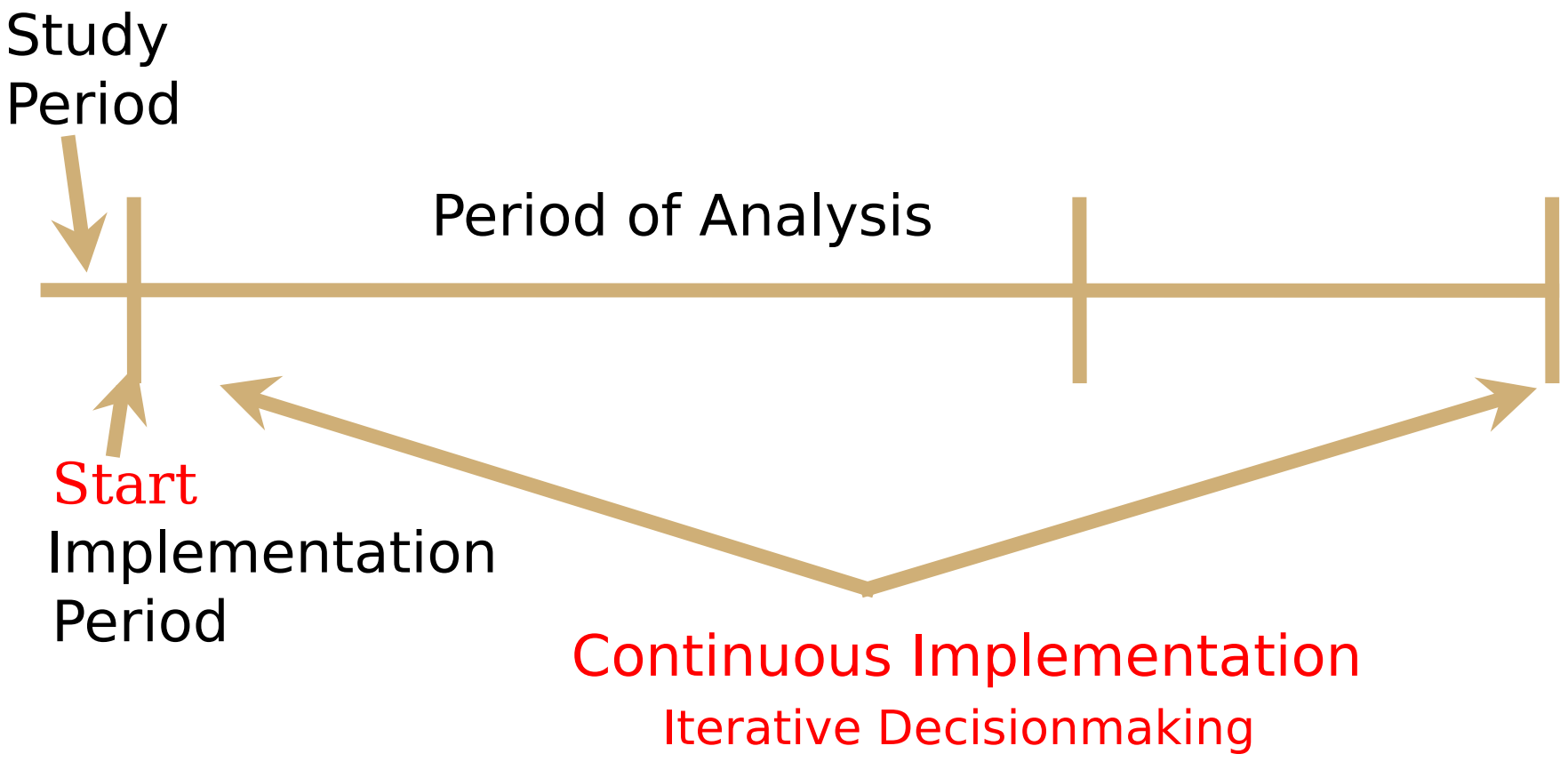

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Sustainable and Resilient Communities

Sustainability: “a synergistic process whereby environmental, [social] and economic considerations are effectively balanced … to improve the quality of life for present and future generations.”

EOP, 2004

Community Resilience: Reduced “vulnerability to dramatic change or extreme events and responds creatively to economic, social and environmental change in order to increase its long-term sustainability.”

UN website

NOLA Re-Population Trends

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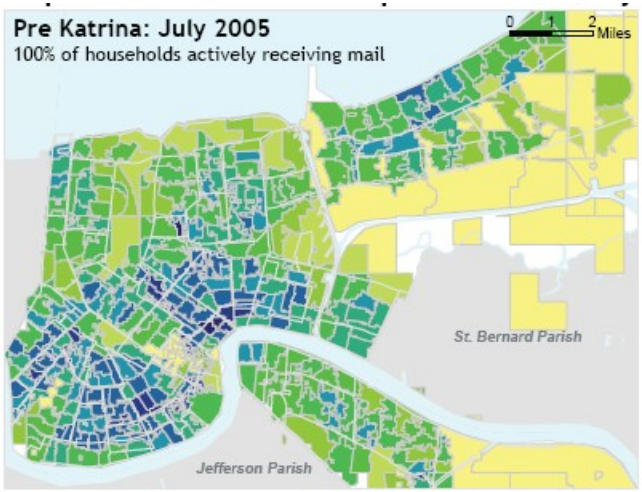
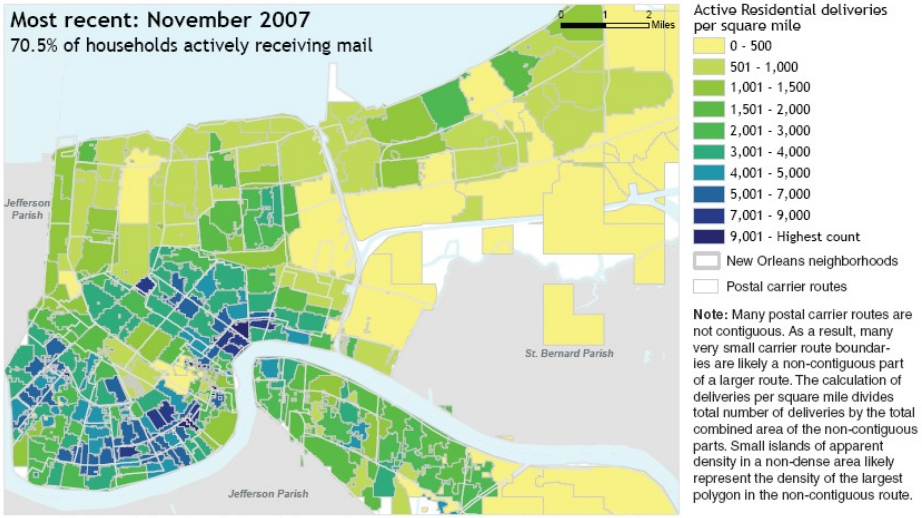
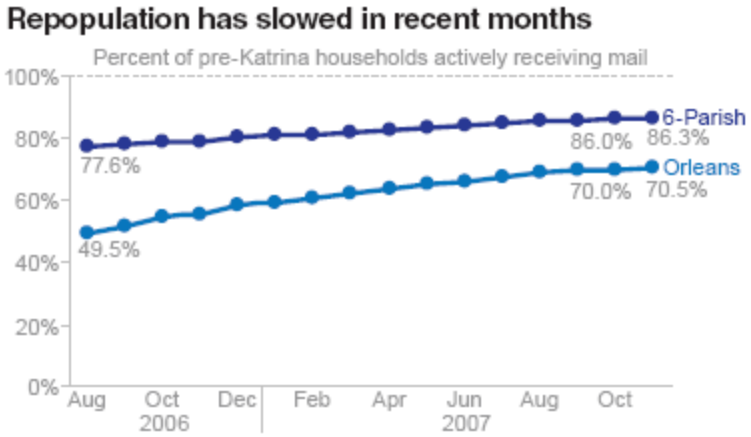



Most recent: November 2007
70.5% of households actively receiving mail
0 1 2 Miles
Jefferson Parish
St. Bernard Parish
Jefferson Parish
Active Residential deliveries per square mile
0 - 500
501 - 1,000
1,001 - 1,500
1,501 - 2,000
2,001 - 3,000
3,001 - 4,000
4,001 - 5,000
5,001 - 7,000
7,001 - 9,000
9,001 - Highest count
New Orleans neighborhoods
Postal carrier routes
Note: Many postal carrier routes are not contiguous. As a result, many very small carrier route boundaries are likely a non-contiguous part of a larger route. The calculation of deliveries per square mile divides total number of deliveries by the total combined area of the non-contiguous parts. Small islands of apparent density in a non-dense area likely represent the density of the largest polygon in the non-contiguous route.

Sources: Postal counts & carrier route boundaries compiled by Sammamish Data Systems from the USPS



Brookings Inst, & GNOCDC
Jan 15, 2008, N.O. Index

Residual Risks – Lower 9th

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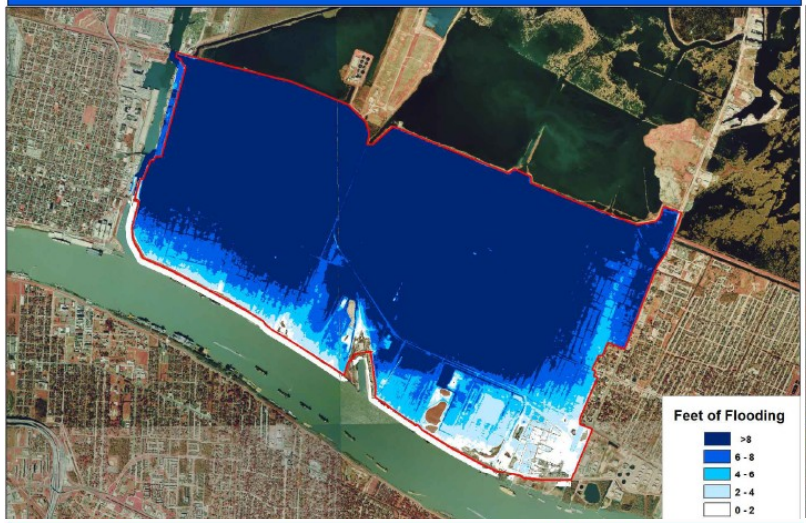
Before Katrina, you had a 1% chance (1 in 100) every year of flooding this deep from Hurricanes in the Lower 9th Ward



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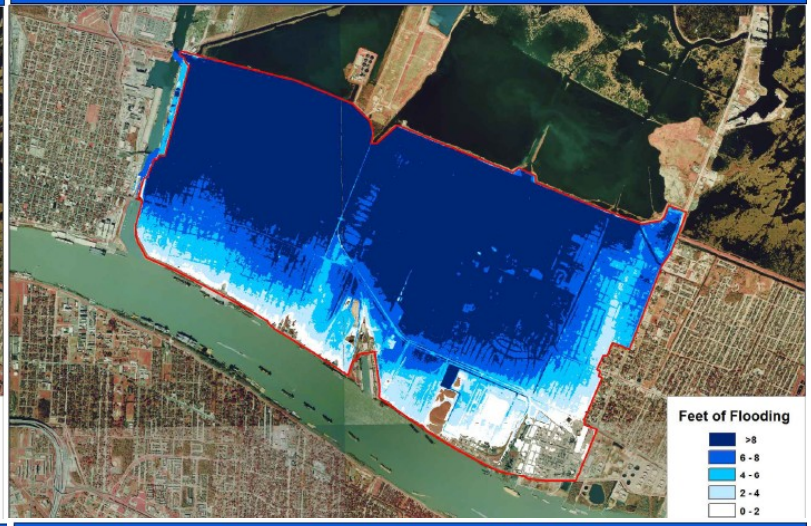

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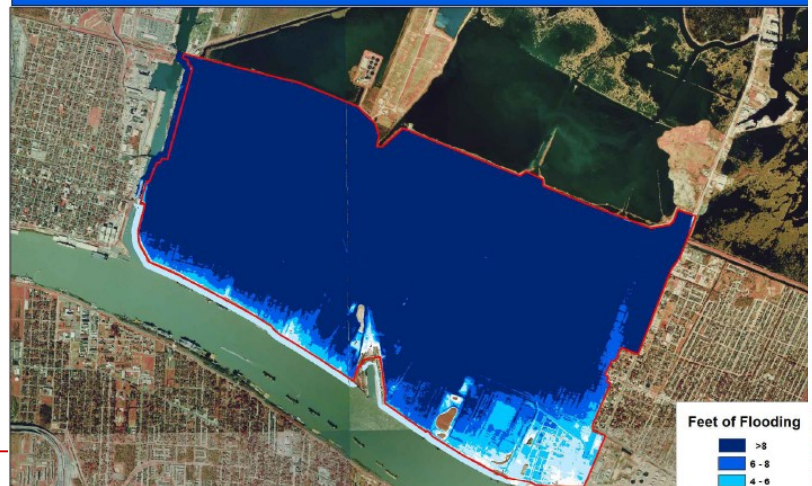

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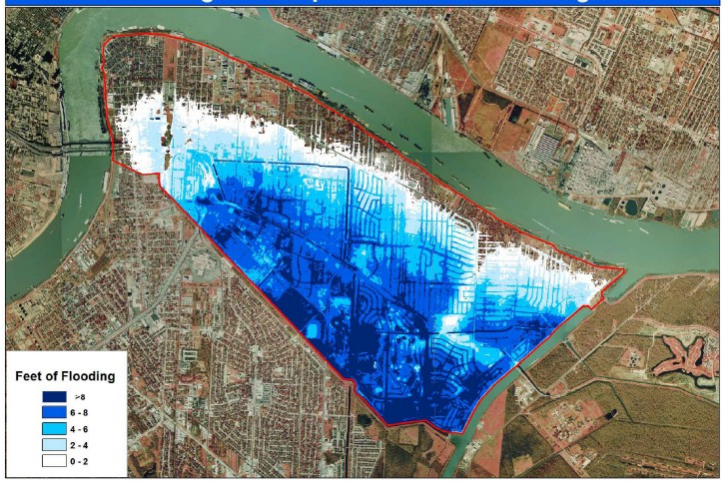
Residual Risks – Algiers

Before Katrina, you had a 1% chance (1 in 100) every year of flooding this deep from Hurricanes in Algiers



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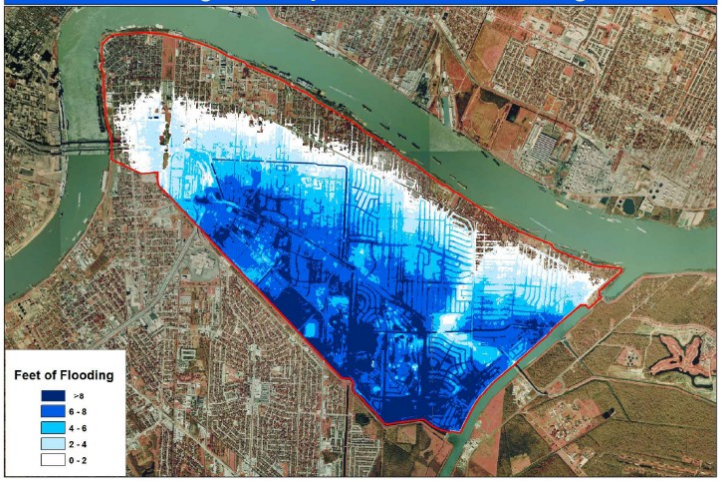

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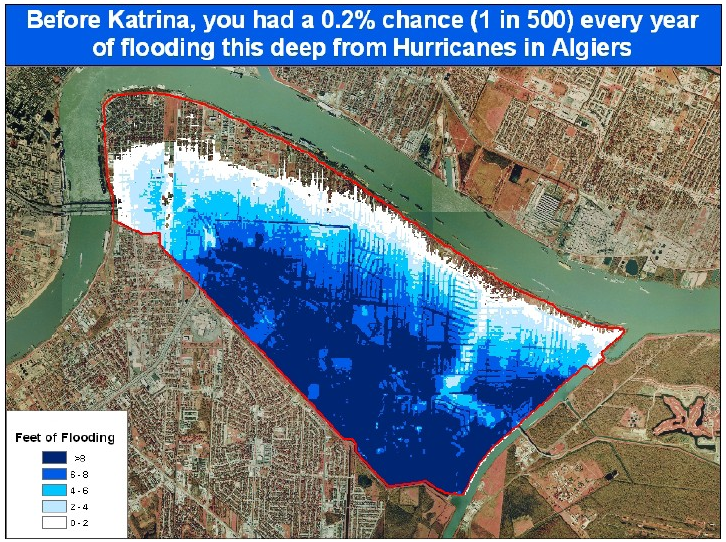

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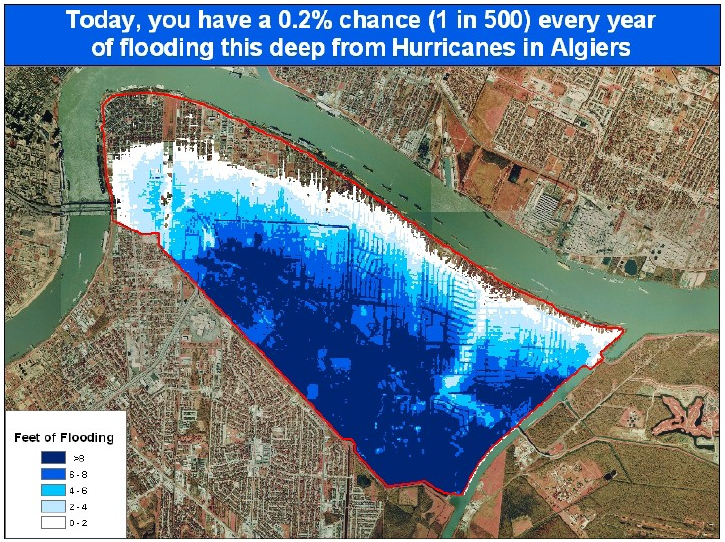

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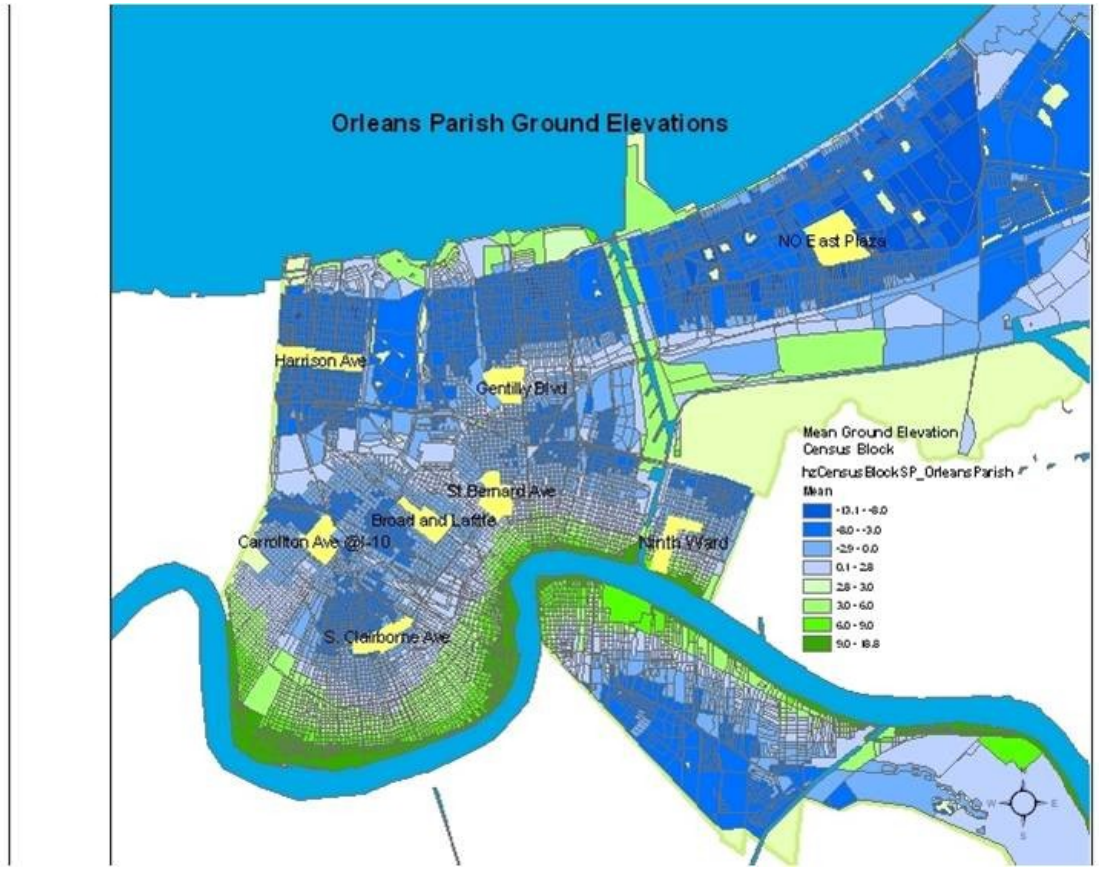
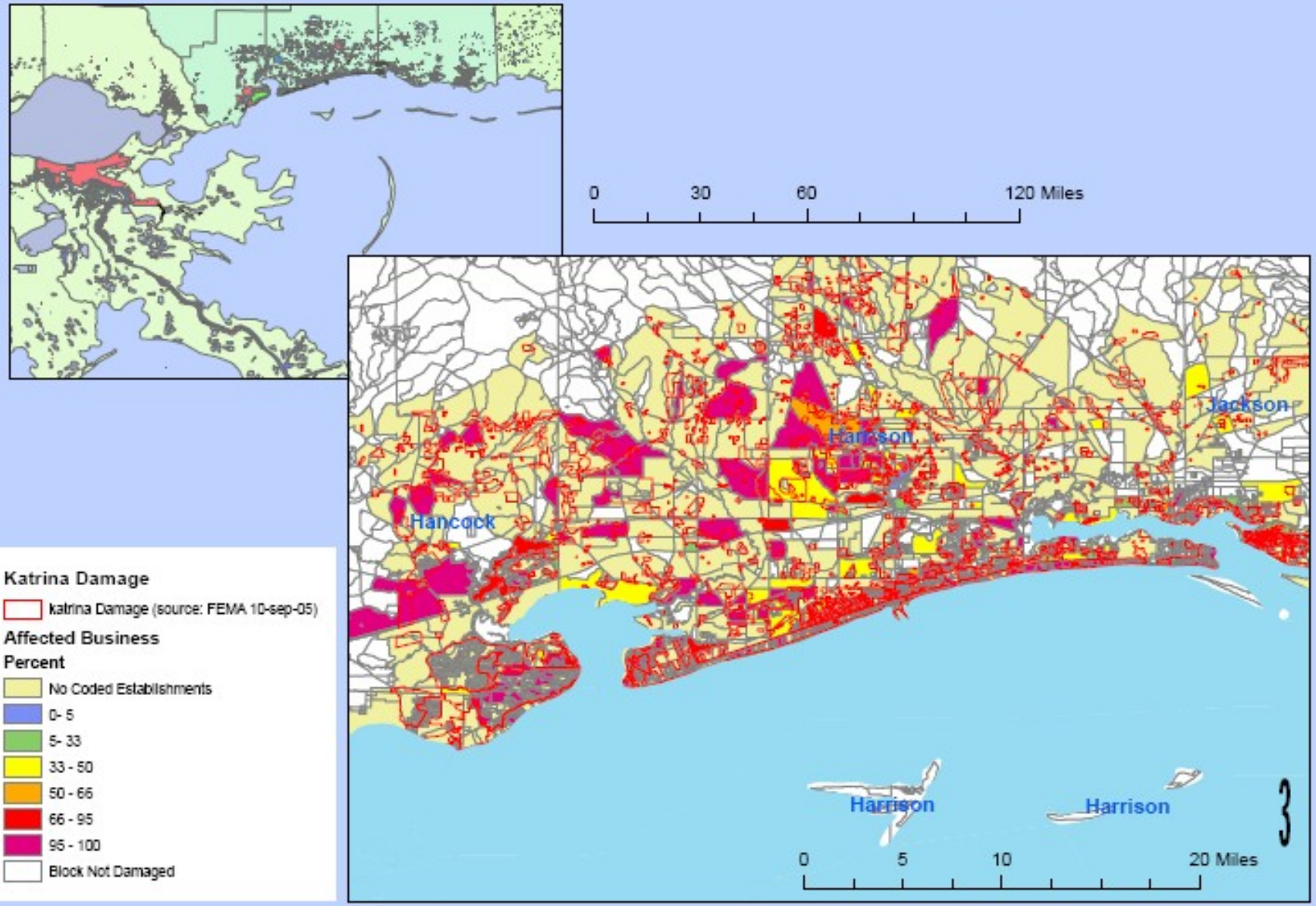
New Orleans Recovery Zones



Katrina Damage in Mississippi Coastline:
Percent of Affected Business in FEMA Areas by Census Block
(Source: Census Bureau/FEMA date:10/09/05)



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Nonstructural Measures are Not Optional

Tendency to view Structural Protection and Non-Structural measures as “either-or” choice, within the Corps and at local level as well.

Must recognize the need for comprehensive plans

- for timing; reduces risk during long implementation period
- for redundancy and resiliency; to manage residual risk

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Nonstructural Measures Already Underway

- CDBG funding from HUD used for
  - housing assistance
  - restoration of public infrastructure
- Small Business Assistance
- Updated Emergency Plans, including evacuation planning
- However, emphasis is largely recovery, not long term risk reduction

Implementation Strategy

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- Phased Implementation (creates timing issues)
- Urgent Near-term Actions
  - Complete improvements to the existing LP&V Hurricane Protection System
  - Improve risk communication with public and among stakeholders – FEMA Map Mod, NOLA Risk Maps
  - Implement floodproofing, elevation-in-place, buyouts in highest-risk portions of the floodplain to complement ongoing recovery efforts
- Continue Collaborative Deliberation of next steps

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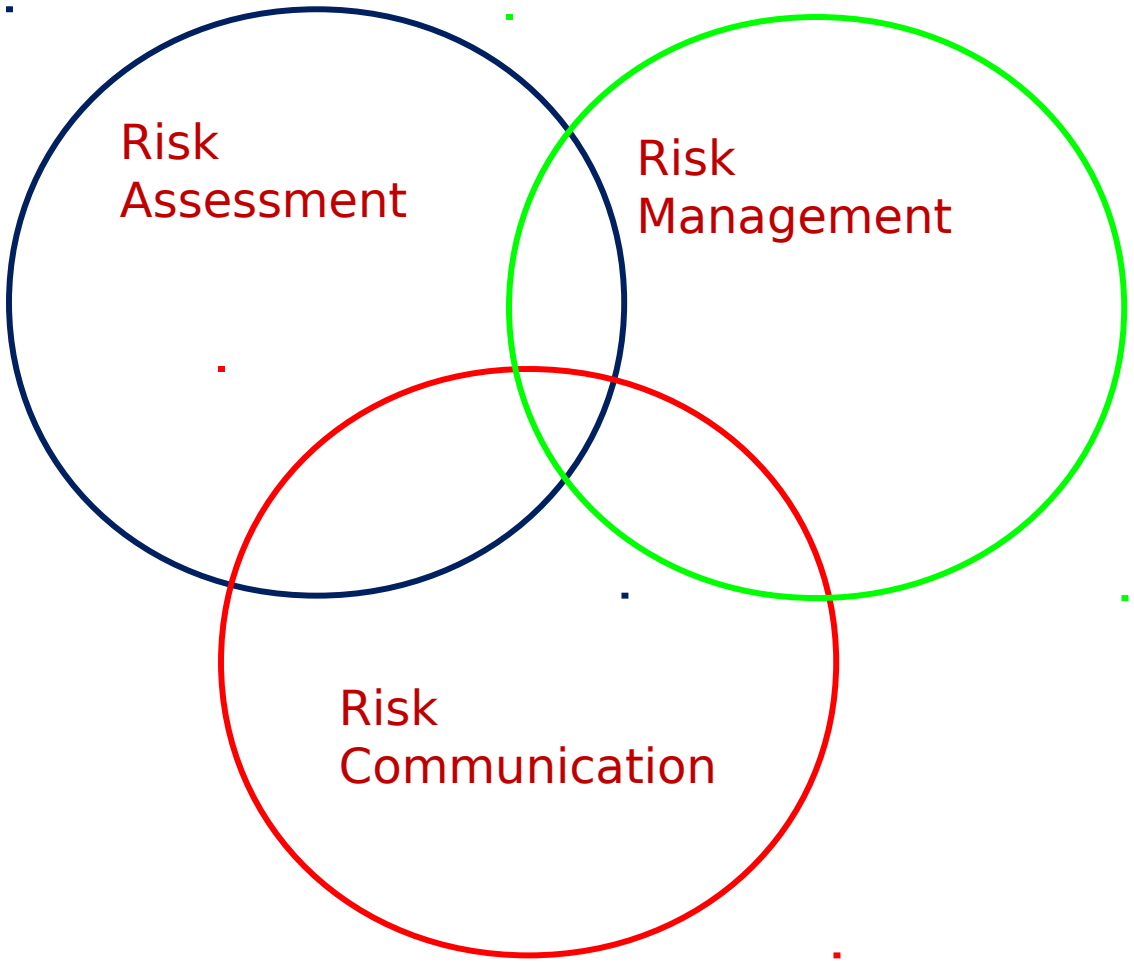
Risk Analysis



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Decision Making

- Must make Risk-Cost trade-off Decisions
- Can’t be afraid to use the “F”-word – Fatality risk must be estimated for base and alternatives
- Damage Reduction and Life-Safety will be key economic and social criteria
- Quality of life, other social indicators will be necessary to fine-tune plans

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Competencies Required

- Risk Assessment Skills
  - Structural Reliability
  - H&H modeling and mapping
  - Decision Analysis with Beachfx and HEC-FDA
  - Improved Fatality Risk Estimates
- Social Impact Assessment
- Communications

Ongoing R&D, Other Work

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- Mental Models to map risk perception, aid risk communication tools
- Dr Shirley Laska, establishing baseline effects of CAT 5 event
- Levee Safety Program
- Actions for Change
- Risk Analysis Models in Decision-making

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Summary & Discussion